

a) Discontinua Reparable

$$\{-4, 0, 4\}$$

b) Discontinua Irreparable

$$\{-3, 2, 10\}$$

c) Continua

$$\mathbb{R} - \{-4, -3, 0, 2, 4, 10\}$$

$$(2) a) \lim_{x \rightarrow \frac{3\pi}{4}} \left(\frac{1 + \tan(x)}{\sec(x) + \cos(x)} \right) = \frac{0}{0} \text{ indet} = \lim_{x \rightarrow \frac{3\pi}{4}} \left(\frac{1 + \frac{\sin(x)}{\cos(x)}}{\sec(x) + \cos(x)} \right)$$

$$\lim_{x \rightarrow \frac{3\pi}{4}} \frac{\frac{\cos(x) + \sin(x)}{\cos(x)}}{\sec(x) + \cos(x)} = \lim_{x \rightarrow \frac{3\pi}{4}} \frac{(\sin(x) + \cos(x))}{\cos(x)} \cdot \frac{1}{(\sec(x) + \cos(x))}$$

$$\lim_{x \rightarrow \frac{3\pi}{4}} \frac{1}{\cos(x)} = \frac{1}{\cos(\frac{3\pi}{4})} = \frac{1}{-\frac{\sqrt{2}}{2}} = \frac{-2}{\sqrt{2}}$$

$$b) \lim_{x \rightarrow 0} \left(\frac{4x + \tan(3x)}{x \cdot \sec(x)} \right) = \frac{0}{0} \text{ indet} = \lim_{x \rightarrow 0} \frac{4x + \tan(3x)}{x \cdot \frac{1}{\cos(x)}} \cdot \lim_{x \rightarrow 0} \frac{4x + \tan(3x)}{x} \cdot x$$

$$\lim_{x \rightarrow 0} \frac{4 + 3 \tan(3x)}{\frac{x}{x \cos(x)}} = \frac{4 + 3}{\frac{1}{\cos(x)}} = \frac{4 + 3}{1} = 7 //$$

$$c) \lim_{x \rightarrow \infty} \left(\frac{x^2 - 9}{x(x^2 + 1)} \right) = \frac{0}{0} \text{ indet} = \lim_{x \rightarrow \infty} \left(\frac{x^2 - 9 \cdot x^0}{x^3 + x \cdot x^2} \right)$$

$$= \lim_{x \rightarrow \infty} \frac{\frac{1}{x^0} - \frac{9}{x^3}}{1 + \frac{1}{x^2}} = \frac{0}{1} = 0 //$$

$$③ a) y = \ln(x) - \sin(x) + \frac{e^x}{4} - \ln(4)$$

$$y' = \frac{1}{x} - \cos(x) + \left(\frac{e^x \cdot 4 - e^x \cdot 4'}{16} \right) - 0$$

$$= \frac{1}{x} - \cos(x) + \left(\frac{e^x \cdot 4 - e^x \cdot 0}{16 \cdot 4} \right) - 0$$

$$y' = \frac{1}{x} - \cos(x) + \frac{e^x}{4}$$

$$b) y = (x^4 + x) \cdot (\sqrt{x} + \cos(x))$$

$$y' = (x^4 + x)' \cdot (\sqrt{x} + \cos(x)) + (x^4 + x) \cdot (\sqrt{x} + \cos(x))'$$

$$y' = (4x^3 + 1) \cdot (\sqrt{x} + \cos(x)) + (x^4 + x) \cdot \left(\frac{1}{2\sqrt{x}} - \sin(x) \cdot 1 \right)$$

$$c) y = \frac{\tan(x)}{e^x}$$

$$y' = \frac{(\tan(x))' \cdot e^x - (\tan(x)) \cdot e^{x'}}{(e^x)^2}$$

$$y' = \frac{(\sec^2(x) \cdot 1) \cdot e^x - (\tan(x)) \cdot e^x}{(e^x)^2}$$

$$(4) a) y = \sqrt{x^2 + \sqrt{\cos(x^3)}}$$

$$y' = \left(\frac{1}{2\sqrt{x^2 + \sqrt{\cos(x^3)}}} \right) \cdot (2x) + \left(\frac{1}{2\sqrt{\cos(x^3)}} \right) \cdot (\sin(x^3) \cdot (3x^2))$$

$$b) y = (x+1)^4 \cdot \sin^3(2 + \ln(x))$$

$$y' = (4(x+1)^3 \cdot 1 \cdot \sin^3(2 + \ln(x)) + (x+1)^4 \cdot 3(\sin(2 + \ln(x)))^2 \cdot \cos(2 + \ln(x)) \cdot \frac{1}{x})$$

$$y' = (4(x+1)^3 \cdot 1 \cdot \sin^3(2 + \ln(x)) + (x+1)^4 \cdot (3\sin^2(2 + \ln(x)) \cdot \cos(2 + \ln(x)) \cdot \frac{1}{x}))$$

$$c) y = \frac{e^{x^5}}{x^5 + x^3}$$

$$y' = \frac{(e^{x^5} \cdot (5x^4) \cdot (x^5 + x^3)) - (e^{x^5} \cdot (5x^4 + 3x^2))}{(x^5 + x^3)^2}$$